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THE PACIFIC NORTHWEST TOUR

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The annual spring Arboretum Tour for 1973 took place from May 18 to 28 and featured a visit to the Pacific Northwest, with centers of operation in Seattle, Washington, and Victoria and Vancouver, British Columbia.

Before embarking upon this tour my wife and I attended the biennial convention of the Cactus and Succulent Society of America which was held at Las Vegas, Nevada, from May 14 to 18.

The program which had been arranged for this four-day conference was of an extremely high order of excellence. There were three full days and evenings of illustrated lectures on a wide variety of subjects ranging from a discussion of the local geology to the cultivation of cacti and succulents in South Africa. Individual genera such as *Pediocactus*, *Echinocereus*, *Idria* and *Crassula* were the subjects of special treatments. The cacti of Nevada and California were presented in detail and a session on grafting techniques was tailor-made for the propagator.

Dr. Larry Mitich, of North Dakota State University, gave a scholarly account of the important contributions



Fig. 2. *Yucca brevifolia* var. *Jaegeriana*



Fig. 1. Sandy Valley, Nevada

to the study of cacti and other plants made by George Engelmann. Dr. Lyman Benson, of Pomona College, in a lecture which many of us considered the high-water mark of the convention, delivered a superb address dealing with the geologic origin of our deserts and their unique floras.

Tuesday, May 15, was set aside for field trips: one group traveling to Lake Meade and Hoover Dam, but the majority of the 300 persons in attendance electing to spend the day on the desert where special permission had been obtained for collecting plants.

Much of southern Nevada lies within that plant community which is known as the Mojave Desert, a vast region of low and uncertain rainfall which occupies a large portion of southeastern California and extends eastward to the Colorado River. One of the most characteristic plants of this desert is the Joshua tree, *Yucca brevifolia*, which is represented in the area around Las Vegas by the variety *Jaegeriana* (*Wolfei*).



Fig. 3 View in the gardens at Chittenden Licks

The site of the field trip was an enormous private ranch in Sandy Valley, lying some twenty miles to the southwest of Las Vegas. Hemmed in on all sides by rugged mountains, the valley floor is an undulating terrain, punctuated by rocky outcrops and shallow ravines (Fig. 1).

Our first impression upon entering the valley was that the vegetation consisted of almost nothing but yuccas. In addition to the variety of Joshua tree mentioned above there were two other species, both in full flower. *Y. baccata* is an acaulescent plant with fibrous-margined leaves and enormous inflorescences of pure white almost globular flowers. In *Y. schidigera* (*Y. nevadensis*) the plant has a short stem or axis and the flowers are more elliptical (Fig. 2).

Closer inspection soon revealed that there was much more to be seen. We were told that the average annual rainfall of this region is approximately four inches and that this year an almost unprecedented three quarters of it had already been recorded. This meant that the desert was in bloom in a manner seldom before observed by local inhabitants. It was, therefore, our good fortune to observe a spectacular, and to the easterner bewildering, display of desert flowers not usually seen in bloom at this or in any single season.

Among the first to claim our attention were the beautiful mariposas or butterfly lilies—two or possibly three species of *Calochortus*. These plants often possess weak, straggly stems which clamber up through any convenient small shrub, so that the handsome three-petaled corollas peer incongruously out from some totally unrelated background of foliage.

The Compositae are well represented in the desert (as in most other habitats) and here were the ghostly white flowers of the morning bride (*Chaenactis Fremontii*), the yellow-flowered *Malacothrix Fremontii* and two species of *Hymenoclea* (*H. Salsola* and *H. monogyna*). Both of the last-named have filiform leaves and flowers in numerous small heads.

There were two intriguing chenopods, both shrubs: *Eurotia lanata*, or winter fat, with fluffy white flowers,

and *Grayia spinosa*, with pinkish bracts suggesting an overgrown *Rumex*. A desert mallow, *Sphaeralcea ambigua*, with peach-colored flowers, was ubiquitous and we were overcome with admiration for the royal purple blossoms of *Dalea Fremontii*.

As might be expected, the creosote bush, *Larrea divaricata*, was all around us, as was a species of *Ephedra* which Dr. Benson identified as *E. nevadensis*. There were occasional plants of the antelope bush, or bitterbrush, *Purshia tridentata*, a wide-ranging member of the Rosaceae with yellowish flowers.

At one point the roadside banks were a mass of pink, due to the low clumps of *Phlox nana*, and at another we came upon an extensive colony of a handsome pink-flowered beard-tongue, which we took to be *Penstemon Palmeri*.

But, after all, this was a Cactus Society excursion. What right had a mere taxonomist to be looking at members of any other family?

The cactus flora of this valley was not particularly rich in species, but it more than made up in quantity and quality for what it lacked in variety. There were three species of *Opuntia*: *O. basilaris*, with bright red flowers and *O. erinacea* with corollas of a clear light yellow. In both of these the plant body is flat and pad-like. *O. ramosissima*, on the other hand, is a branched cylindrical form in which the petals are yellow, tinged with green.

Ferocactus acanthodes is a melon-shaped species with bright pink spines which take on an intense red glow when moistened. *Echinocactus polycephalus* seems to emulate "hen and chicks" by producing an indefinite number of globose offspring around a center. *Echinocereus Engelmannii* forms clumps of upright viciously-spined joints crowned by elegant reddish flowers.

Coryphantha deserti is a small, usually solitary, plant densely covered with spines, producing creamy-yellow flowers that are tipped with purple. All in all, this was a memorable day, alike for the cactophile and the general botanist.

On Friday, May 18, my wife and I flew from Las Vegas to Los Angeles, where we changed planes for Seattle.



Fig. 4. View in Mrs. Miller's garden, The Highlands



Fig. 5. *Lewisia Cotyledon*

The flight between Los Angeles and Seattle was very exciting. Visibility was almost unlimited and we flew for many miles with the snow-capped Sierra Nevadas in full view to the east. Soon Mt. Shasta came into sight and we then passed almost directly over Crater Lake, Oregon, and shortly after sighted Mt. Hood, in the northern section of the state. Then came the mountains of Washington, Mt. Adams, Mt. St. Helens and, climaxing it all, Mt. Rainier. All of these mountains are of volcanic origin and form part of that vast "Ring of Fire" which extends from Japan, through the Aleutian Islands and Alaska and continues southward through western North America to Mexico and Central America.

We arrived in Seattle about 11 A.M. and soon thereafter flights began coming in from the east, each bringing its consignment of tour members, so that shortly after noon all twenty-nine of us were on hand and were on our way to check in at the Olympic Hotel in downtown Seattle.

The following morning, May 19, we went by chartered motorcoach to visit the gardens of the Hiram M. Chittenden Locks. This ship-canal and lock system was constructed in 1916 to separate the salt water of Puget Sound from the fresh water of Lake Washington. Since 1940 Mr. Carl S. English, Jr. has been in charge of laying out and planting the grounds adjacent to the locks and the result is a garden of great charm and botanical interest. Winding walkways provide a continuing succession of new vistas and a rich variety of plant material (Fig. 3).

Since Dr. R. B. Gordon described these gardens in Issue No. 4 (January 1970) of this *Newsletter*, mention will be made here only of those plants not included in his account. As in his case, so too, we were fortunate in having Mr. English conduct us through this realm of beauty which he had created.

Almost the first plant to engage our notice was *Bupleurum fruticosum*. To those who think of the parsley family as composed entirely of herbaceous plants with finely divided foliage, the existence of this semi-evergreen shrub with simple, entire, oblong leaves comes as something of a shock, especially if it is not in flower or fruit. Some of us, who had seen a related species growing in the Atlas Mountains of Morocco, were somewhat more

disposed to accept it as a member of the Umbelliferae. It is probably the only woody representative of that family found in cultivation in temperate North America.

Seattle is famous, among other things, as a center for rhododendron growing and we were fortunate to be there at a time when so many of these magnificent shrubs were at the height of their bloom. One of the most impressive was the bright red-flowered 'Britannia', which some members of the tour recalled having seen at the Kalmthout Arboretum in Belgium several years ago.

Of the many hundred trees and shrubs in these gardens there is space to single out only a random few.

Garrya elliptica. The genus *Garrya* belongs to a small group of shrubs and trees of somewhat uncertain taxonomic affinities. This species, which was in full flower, is conspicuous because of its drooping staminate aments which may be six or eight inches in length.

Choisya ternata. The so-called "Mexican orange" is an interesting member of the Rutaceae with trifoliate leaves and fragrant white flowers. Although usually assigned to Zone VI, we know of no one who has ever succeeded with it in the Philadelphia area.

Arctostaphylos tomentosa. To the easterner the name *Arctostaphylos* is likely to mean only the bearberry, *A. uva-ursi*, a prostrate trailing sub-shrub common in the Pine Barrens of New Jersey. In the west, however, there are numerous species, all shrubby and some known as 'manzanita', because of the small, reddish apple-like fruits.

Leucothoe Davisiae. An evergreen shrub, native to Oregon and California, with graceful upright panicles of pure white flowers.

Nothofagus Dombeyi. The genus *Nothofagus* is a member of the Fagaceae which is found only in the southern hemisphere. The species in question is indigenous to Chile.

Quercus spp. There is a fine collection of oaks in these gardens. In addition to such western American species as *Q. agrifolia*, *Q. chrysolepis*, *Q. Kelloggii*, *Q. Sadleriana*, and *Q. vaccinifolia*, there were *Q. Cerris*, *Q. Ilex* and *Q. canariensis* from Eurasia and *Q. myrsinaefolia* and *Q. mongolica* from the Far East.



Fig. 6. Drug garden of the University of Washington



Fig. 7. *Ceanothus velutinus*

Lithocarpus spp. Another member of the beech family, represented by *L. densiflora* and *L. echinoides* from the Pacific coast and *L. (Pasania) edulis* from Japan.

That the Seattle area is blessed with very favorable growing conditions is attested by the fact that within the limits of these gardens may be found growing such circumpolar plants as *Ledum groenlandicum* and *Dryas octopetala*, together with the fan palm, *Trachycarpus Fortunei*, from southeastern Asia.

Following our visit to the Locks we drove to the Seattle Golf Club at The Highlands where we were guests of Mrs. Pendleton Miller for luncheon, after which we had the rare privilege of seeing her garden which is but a short distance away (Fig. 4).

I had long known about this distinguished garden and when I wrote to Mrs. Miller asking permission to visit it she replied that she would be happy to have us, but protested that we must not expect a show place, saying that her plants are located according to microclimates on an area of only four acres. She added that the collection includes about 3000 species belonging to 665 genera and 139 families!

This garden is located on a steep slope, overlooking the Sound and dominated by native vegetation. This was our first opportunity to see at close range, and in full



Fig. 8 View in University of Washington Arboretum

bloom, the madrone (*Arbutus Menziesii*), the western dogwood (*Cornus Nutallii*), the salal (*Gaultheria Shallon*) and the attractive evergreen blueberry (*Vaccinium ovatum*). Material of the last-named is frequently shipped eastward at Christmas time for "greens".

In a brief account such as this it is totally impossible to convey any adequate impression of the richness of this collection or of the consummate skill by which each rare and interesting plant is assigned to its appropriate ecological niche. It is hoped that the following randomly selected observations will serve as a substitute for the more lengthy description which this garden so richly deserves.

Lewisia, a member of the Portulacaceae, includes about twenty species of succulents found in western North America. The genus was named in honor of Captain Meriwether Lewis of the Lewis and Clark expedition. The type species, *L. rediviva*, known as resurrection plant or bitter-root, gives its name to the Bitter Root Mts. and is the state flower of Montana.



Fig. 9. Japanese garden in University of Washington Arboretum

Mrs. Miller has more than a score of species and varieties of this fascinating genus, truly an amazing assemblage. The only ones we happened to see in flower at the time of our visit were *L. Cotyledon* and its white-flowered form (Fig. 5).

Even more impressive is the genus *Rhododendron*, of which there here are 360 species and varieties, a record of which any garden in the world might be inordinately proud.

In the Locks Gardens we had seen *Eucryphia glutinosa*, a member of a small genus which occurs only in Australia, Tasmania and Chile. Mrs. Miller has not only the single and double flowered forms of this species, but in addition *E. intermedia* and *E. Nymansay*.

Nothofagus, another genus which is restricted to the Southern Hemisphere, is represented here by *N. antarctica* and *N. Dombeyi* (both of which she considers hardy) as well as *N. fusca*, *N. Menziesii* and *N. obliqua*, which have yet to prove themselves.



Fig. 10. Mt. Rainier from Paradise Inn

There were several representatives of such élite genera as *Trillium*, *Cyclamen*, *Dodecatheon*, *Geum*, *Leontopodium* and *Penstemon*. Among native woodland perennials there were *Maianthemum dilatatum*, *Clintonia uniflora*, *Trientalis latifolia* and several species of *Erythronium*.

A brilliant spot of gold was provided by *Genista pelucida*, while the so-called California lilacs (selections and hybrids of *Ceanothus*) delighted the eye with subtle shades of misty blue flowers.

Across the front of the house was festooned a fine specimen of *Actinidia Kolomikta*, an Oriental vine in which many of the cordate leaves are brilliantly tinged with pink.

Before departing we tendered a warm expression of thanks to Mrs. Miller for her very generous hospitality.

On Sunday morning, May 21, we went first to see the Drug Garden of the School of Pharmacy of the University of Washington. My wife and I had been here in 1960 and were now pleased to see that the area of the garden had been greatly increased and the number of medicinal plants considerably augmented. Dr. Lynn R. Brady, director of the garden, informed us that although the number of species varies from time to time, the collection



Fig. 11. Basaltic outcrops west of Rimrock

contains at present about 475 different kinds of plants with therapeutic properties (Fig. 6).

One needs perhaps to recall that nearly all of the early botanical gardens of Europe were attached to universities where medicine was taught and that they served the primary function of enabling the prospective physician to learn to recognize the plants which were of vital importance to him in the practice of his profession.

It is indeed gratifying to witness a revival of this old tradition and especially so since, as in the present instance, it is both aesthetically pleasing and educationally significant.

We next wandered for some time around the beautiful campus of the University which contains a fine rose garden and many superb mature trees such as deodars, cedars of Lebanon, California big trees and numerous others.

Following lunch we made our way to the University of Washington Arboretum, where we were received by the Assistant Director, Mr. Joseph A. Witt. While Mr.



Fig. 12. Kittitas Valley

Witt was welcoming our group and telling us something about the arboretum we noted around us several interesting plants. One was *Ceanothus velutinus*, a native evergreen shrub with large panicles of creamy white flowers, which we were to see often again during the next few days (Fig. 7). Another was the snow eucalyptus (*E. niphophila*) from Australia; we are more than ever inclined to believe that this species should be tried in the eastern states. Then there was *Cytisus Battandieri*, all the way from the Atlas Mountains of Morocco, an upright shrub with globular clusters of golden yellow flowers.

Joe first led us through the lath houses, with their wealth of exciting plant material, including the wheel-of-fire tree (an Australian protead) and a gorgeous blue poppy (*Meconopsis Baileyi*) from the Himalayas.

We then set out on a tour of the arboretum's 200 acres which occupy an elongated valley, formerly a city park (Fig. 8). Here, as at the locks, rhododendrons held the center of the stage, but there were many other plants to claim our attention. One of the first was *Quercus robur*



Fig. 13 Petrified logs at Ginkgo Museum

'Concordia', a bright yellow-leaved form of the English oak which none of us had ever seen before. Another remarkable tree was *Aesculus* $\times$ *carnea* 'Briottii'. *A.* $\times$ *carnea* is itself a hybrid between the Old World horsechestnut, *A. Hippocastanum*, and *A. Pavia*, the red buckeye of our southeastern states. It bears flesh-colored flowers and is well known in cultivation in eastern United States and western Europe. The variety 'Briottii', on the other hand, has flowers of an almost unbelievable scarlet and, although introduced into horticulture well over a hundred years ago, is certainly not widely, if at all, grown in our area.

If no mention has been made before of the two common maples of the area it certainly has not been because of our failure to see them. Here they formed a backdrop for many of the more showy plants. They were, of course, the big-leaf maple (*Acer macrophyllum*) and the vine maple (*A. circinatum*).

We were interested in a deciduous shrub known locally as red huckleberry (*Vaccinium parvifolium*), but in reality a blueberry reminiscent of the red 'blueberry' (*V. erythrocarpum*) of our southeastern states. Another plant which reminded us of home was *Rubus parviflorus*, the western counterpart of our purple-flowered raspberry (*R. odoratus*.)

An attractive feature of the arboretum is a Japanese Garden which is situated at the far end of the property (Fig. 9). Here are the bridges, the stones, the wisteria arbors, the maples, the azaleas and all the other features which one has come to associate with this highly sophisticated realm of horticulture.

We were pleased to observe here a specimen of *Trochodendron aralioides*, its radially spreading stamens and carpels fully justifying the common name of wheel tree. Several of us recalled having seen this species in flower near the foot of Mt. Fuji on our Japanese Tour. Although we have had a plant of this evergreen tree at the arboretum for more than twenty years it has never produced flowers.

On our way back to the Administration Building we followed a different route and saw many new groupings. One of these was a collection of species and hybrids of *Cytisus* in a dazzling array of colors.

In the section devoted to magnolias we were interested to observe *M. sinensis*, *M. Wilsonii* and *M.* $\times$ *highdownensis* which is supposedly a hybrid between these two. Joe then showed us a mature plant of the rare *Rehderodendron macrocarpum*, a native of western China belonging to the Styracaceae or storax family. He had sent us two small specimens of this species two years ago, but they have not survived our winters.

Our schedule now called for a two-day excursion through Mt. Rainier National Park, by way of Paradise, to Yakima and back to Seattle the next day via Chinook Pass. Mr. Witt was unable to accompany us on this trip, but he very kindly offered us the services of his wife Jean as guide and mentor. Jean Witt is a trained botanist with an intimate knowledge of the local vegetation and geology. Not only that, she had served in this same capacity when the International Botanical Congress met in Seattle in 1969. Needless to say, we were delighted to have her with us.

We left Seattle on the morning of May 21 and traveled southward to Elbe where we turned eastward toward the Park. The weather was perfect and we were favored with ever more tantalizing views of Rainier's snow-crowned summit. Soon we entered the forest near the base of the mountain, a forest composed mostly of conifers: western hemlock (*Tsuga heterophylla*), Douglas fir (*Pseudotsuga Menziesii*), Nootka cypress (*Chamaecyparis nootkatensis*) and western red cedar (*Thuja plicata*). An alder (*Alnus sinuata*) was just coming into bloom and the devil's club (*Oplopanax horridus*) formed dense tangles—woe to him who attempts to force his way through them!

We caught occasional glimpses of the blood currant (*Ribes sanguineum*), with its racemes of bright red flowers, and also of *Lonicera involucrata*, a honeysuckle which is characterized by conspicuous bracts below the inflorescences.

We stopped at the visitor entrance for pictures of the towering peak, 14,410 feet above sea level, and to inspect a cross-section of the trunk of a Douglas fir which had begun life in the year 1292. We later saw much older ones.



Fig. 14. Sand dunes along Columbia River



Fig. 15. Forest on slopes of Hurricane Ridge

As we ascended the mountain we passed a place where in 1947 a gigantic mudflow had come tearing down the slopes destroying the trees and burying everything under many feet of detritus. These flows, which are not uncommon, occur when ice dams up a valley and heavy rains accumulate and cause such a pressure that the whole mass breaks away and roars down like an avalanche.

A little farther up we passed over the valley of the Nisqually Glacier, one of twenty-seven "rivers of ice" which are to be seen on the flanks of Mt. Rainier. During the present century many of these glaciers have receded, some as much as a mile (indicating an amelioration of the climate), but during the last decade or so there seems to have been an advancing trend, which means that ice accumulation is now exceeding melting.

The highest point achieved by the highway is Paradise at an altitude of about 5400 feet. Here there is a comfortable visitor center with a cafeteria, shops, natural history exhibits, an observatory and a theater in which a slide-show depicting the mountain in all of its moods is almost continuously in progress. Best of all, though, was the view which this vantage point provided of the summit far above us (Fig. 10).

The entire area around us was still under several feet of snow and about the only plant we saw was the sub-alpine fir (*Abies lasiocarpa*). A month or so later, when thaws occur, these slopes would be ablaze with a multi-colored carpet of alpine flowers.

Descending the mountain in an easterly direction, we stopped at its foot and after a fifteen minute walk entered "The Grove of Patriarchs". Here were the oldest and tallest of the conifers we had yet seen, "cedar", "cypress" and hemlock but, topping them all, the Douglas fir, many far older than the one we had seen in cross section earlier at the park entrance.

On the forest floor were several ferns, among them the oak fern (*Thelypteris Dryopteris*), apparently identical with our eastern form. The western wild ginger, however, is *Asarum caudatum*, in which the tips of the chocolate brown sepals are long acuminate. *Trillium ovatum* was the commonest of the "wake robins" and *Clintonia uniflora* took the place of our *C. borealis*. One of the most

endearing plants was the vanilla leaf (*Achlyas triphylla*), an herbaceous member of the Berberidaceae with three-parted leaves and upright racemes of pure white flowers.

As we left the Park and drove eastward through White Pass we came out into the valley of the Tieton River. We made several stops west of Rimrock to admire and photograph the spectacular columnar basaltic outcrops which provide silent testimony to the violent volcanic disturbances which occurred in this area during mid-Tertiary time (Fig. 11).

That night found us in comfortable quarters in Yakima and the next morning with our competent guide, Jean Witt, in charge, we drove north toward Ellensburg, where we turned east and headed toward the valley of the Columbia River. This area lies largely in the Kittitas Valley and since it is in the rain shadow of the Cascade Mountains the precipitation is very scanty and near-desert conditions prevail (Fig. 12). We looked across mile after undulating mile of sagebrush (*Artemisia tridentata*) accompanied by a few other composites, such as *Erigeron*, and several tufted grasses, e.g., *Oryzopsis*. We were somewhat surprised to find here a purple sage (*Salvia Dorrii*), the same species we had seen in Sandy Valley in Nevada. Gradually we began to realize that several of the plants of the Mojave Desert are also represented in the Upper Sonoran and Great Basin areas. A similar example is the antelope bush (*Purshia tridentata*), although in this case the southern population may be varietally distinct.

At the point where the road meets the Columbia River there is located the Ginkgo Petrified Forest and Museum. We spent a fascinated half hour here, viewing fossil specimens not only of *Ginkgo* but a large number of other genera, few of which grow in this region at present.

The ginkgoes, for example, date back to Permian time (over 200 million years ago) and during Mesozoic and most of Tertiary enjoyed a world-wide distribution, especially in the northern hemisphere. Today there is but a single genus and species, (*Ginkgo biloba*) and even it may no longer exist in the wild state, although it probably survived until historic times somewhere in central China.

According to Mr. Witt, the petrified ginkgo wood here comes largely from a late Miocene formation called Van-



Fig. 16. Rock Garden at Victoria



Fig. 17. The Butchart Gardens

tage sandstone that is interbedded in the Columbia flows known as Yakima basalt. This would indicate that this forest existed here some twelve or fifteen million years ago.

Callitris, *Cercidiphyllum*, *Metasequoia* and *Pterocarya*, of all of which we saw fossil remains, are unknown today in the western hemisphere, and such genera as *Carya*, *Diospyros*, *Gordonia*, *Liquidambar*, *Nyssa* and *Taxodium*, although they occur in North America, are restricted to the eastern part of the continent. All of this indicates that there have been dramatic climatic changes in this geologically new area within the last few million years.

After visiting the museum and inspecting the petrified logs on the grounds outside (Fig. 13) we wandered through the sagebrush along the river bank. Here we found again *Grayia spinosa*, the same species we had seen in Nevada. In this case, however, we must have been close to the type locality, for David Douglas discovered this plant in the Columbia basin in 1826.

We crossed the river and proceeded southward along its eastern bank through a fascinating region of sand dunes and basaltic outcrops (Fig. 14). Some twenty miles farther down we re-crossed the river at a point only a few miles above the place where Lewis and Clark, who had journeyed down the Snake River, first saw the Columbia on October 16, 1805.

After a brief pause for lunch in Yakima we started out on our return to Seattle, going by way of Naches, Hell's Crossing (where we stopped for a few minutes to enjoy the beauty of its giant conifers—mostly *Abies grandis*—and rich herbaceous flora) and the Chinook Pass. Our fine weather had deteriorated and although this was a breath-taking drive, we saw little of the mountain whose eastern flank we were traversing.

On Wednesday, May 23, we left Seattle and by ferry and bridge crossed Puget Sound and entered the Olympic Peninsula. Our objective was Hurricane Ridge in Olympic National Park.

After checking in at the visitor center, our coach began the ascent to Hurricane Hill which lies at an elevation

of over 5700 feet. Had the day been clear we would have enjoyed spectacular views of the snowy peaks to the south and west of us. However, the clouds hung low and we were forced to be content with nearby scenery: deep gorges, stark ridges and boulder outcrops. A study of the vegetational zones through which we passed was in itself worth the trip (Fig. 15).

As we left the entrance we were in what is known as the Transition Zone and were surrounded by Douglas fir, red cedar and western hemlock. Mixed with these were big-leaf maple and vine maple.

Between 1500 and 3000 feet we traversed the Canadian Zone, characterized by Pacific silver fir (*Abies amabilis*), western white pine (*Pinus monticola*) and Sitka spruce (*Picea sitchensis*). Toward its upper limits the maples disappear.

The Hudsonian Zone ranges up to about 5000 feet with Nootka cedar, subalpine fir (*A. lasiocarpa*) and mountain hemlock (*Tsuga Mertensiana*) as the dominant types.

Finally above 5000 feet one emerges into the Arctic-Alpine Zone which is essentially treeless, except for low scrubby growth. It is here, when the snow melts, that a rich flora of showy alpine perennials makes its appearance.

Following our trip up the ridge we drove to Port Angeles where we took the ferry across Strait Juan de Fuca to Victoria, the provincial capital of British Columbia.

There was nothing scheduled for the next morning, so we had an opportunity to become acquainted with this beautiful city, justly known as the "City of Gardens." Our fine hotel, the Empress, is situated on the Inner Harbour and across an attractive park from the Parliament Buildings.

Some of us that morning paid a visit to Undersea Gardens in the Inner Harbour where one descends below the surface of the Pacific Ocean and views the varied invertebrate and vertebrate life, as well as some of the algae, that abound in the Puget Sound area. At regular intervals a scuba diver descends into the large exhibition tank, holds up and describes many of the life forms, culminating in the octopus.



Fig. 18. *Quercus Garryana* in Beacon Hill Park



Fig. 19. Glacial striae

We stopped briefly at the Wax Museum, with its interesting historical groups, and then repaired to the handsome new Provincial Museum with its wealth of exhibits including native arts and crafts, natural history and modern technology. Close to the museum is a beautifully constructed rock garden, devoted exclusively to native species (Fig. 16). Here we were able to see close at hand many of the plants of which we had caught only fleeting glimpses from the bus.

There are only two species of *Rhododendron* native to this area. One is *R. albiflorum*, a deciduous, white-flowered shrub known as Cascades azalea, which we were too early to see in bloom. *R. macrophyllum*, on the other hand, is an evergreen species with luscious pink flowers; it is the state flower of Washington. It was in full bloom at the time of our visit and we were glad to get a close look at it in this rock garden.

The western relative of our New Jersey turkey beard is *Xerophyllum tenax* or bear grass. It, too, has harsh, grass-like leaves and racemes of pure white flowers. This was our first opportunity to examine it.

Here was another *Arctostaphylos*, this one *A. columbiana*, its clusters of small fruits already turning reddish brown, and with it the same handsome *Ceanothus velutinus* we had admired at Seattle.

Among other plants worthy of mention were Labrador tea (*Ledum groenlandicum*), curlew-berry (*Empetrum nigrum*) and an elegant blue-flowered beard-tongue (*Pentstemon serrulatus*).

That afternoon we drove out to the celebrated Butchart Gardens, some thirteen miles northwest of the city. These gardens, comprising thirty acres, were the estate of Mr. and Mrs. Robert P. Butchart and were begun in 1904 with the planting of an abandoned limestone quarry. Today they constitute a veritable fairyland with miles of paths winding through rock gardens, a sunken garden, a rose garden, a Japanese garden, an Italian garden and countless perennial beds (Fig. 17).

One of the most attractive features of the garden was the great number of hanging baskets filled with brilliantly colored butterfly flowers (*Schizanthus*).

Years ago Mrs. Butchart had obtained from the Royal Botanical Gardens at Edinburgh seeds of the gorgeous blue poppy (*Meconopsis*) of Tibet. Today these plants constitute one of the chief centers of attention.

Viburnum Davidii is a low-growing evergreen species from Western China in which the leaves are so distinctly parallel-veined as almost to suggest the foliage of a melastome. It was here planted very effectively as a ground cover along a section of the upper walkway.

A greenhouse is well stocked with primroses, begonias, calceolarias, cyclamens and many other colorful plants.

Lining the exit driveway is a row of glowing red English hawthorns—one supposes *Crataegus Oxyacantha* 'Paul Scarlet'. Whatever their name, they serve to leave with the departing visitor a lasting impression of the beauty of these spectacular gardens.

On the way back to the hotel our chauffeur drove us through the beautiful Uplands suburbs of Victoria where each house and garden seemed lovelier than the last.

The morning of Friday, May 25, was also at leisure and many of us signed up for a sight-seeing tour that featured an hour-long visit to Sealand in Oak Bay. This is another underwater aquarium, like the one in Inner Harbour, but is enlivened by the diving of sea birds (seen through glass), the feeding of the sea lions and the antics of a young, (but 20-foot long) killer whale, whose intelligence seemed to us to match that of the porpoise.

That afternoon we took the active members of the group on a walking tour, stopping first at the rock garden in front of the museum mentioned earlier. We then paid a visit to Beacon Hill Park, an area of 184 acres with quiet walks, streams and ponds and great masses of rhododendrons and other shrubs. We were curious about an oak which we had seen planted everywhere in gardens and as a shade tree. It was common in the Park and we identified it as *Quercus Garryana* which, although deciduous, has much the same gnarled appearance and horizontal branching as the live oak of our southeastern states (Fig. 18).

Before returning to the hotel we made a detour to examine a granitic outcrop which had been scoured by

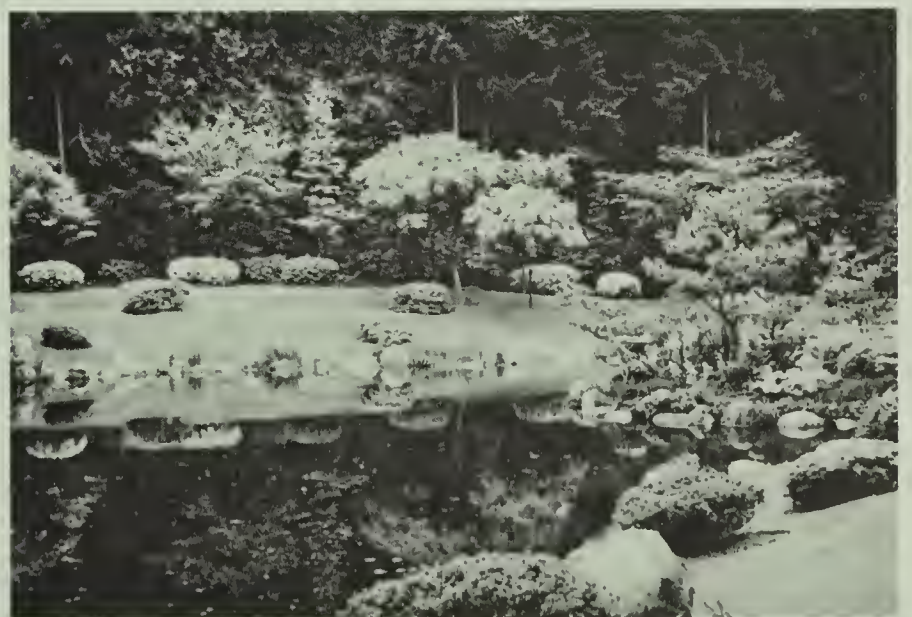


Fig. 20. Nitobe Garden on University of British Columbia campus

the great Canadian glacier in Pleistocene time and exhibited wonderful grooves or striae gouged out by the ice as it moved across its surface (Fig. 19).

In mid-morning on Saturday we left our hotel, drove up to Swartz Bay and put our coach on the ferry which took us through the picturesque Gulf Islands and across the Strait of Georgia to Vancouver, Canada's major western city.

Sunday, May 27, our only full day in Vancouver, was indeed a full one. Our first visit was to the campus of the University of British Columbia, where we were cordially received by Dr. John W. Neill. After favoring us with a brief account of the character and achievements of Dr. Inazo Nitobe, he conducted us into the delightful garden which bears the name of this distinguished Japanese philosopher and humanist.

This was the third Japanese garden we had seen on our tour and in many respects it was the most satisfying (Fig. 20). The skilful use of water, bridges, lanterns and the existence of a tea house combine to create the illusion that one is in Japan, rather than Canada. The wonder is that this impression can seem so authentic when most of the plant material is native to the Pacific Northwest, rather than to the Orient.

Dr. Neill then took us on a tour of the campus and, although he was too modest to admit it, we later learned that some of the most original and imaginative plantings he showed us were of his own design.

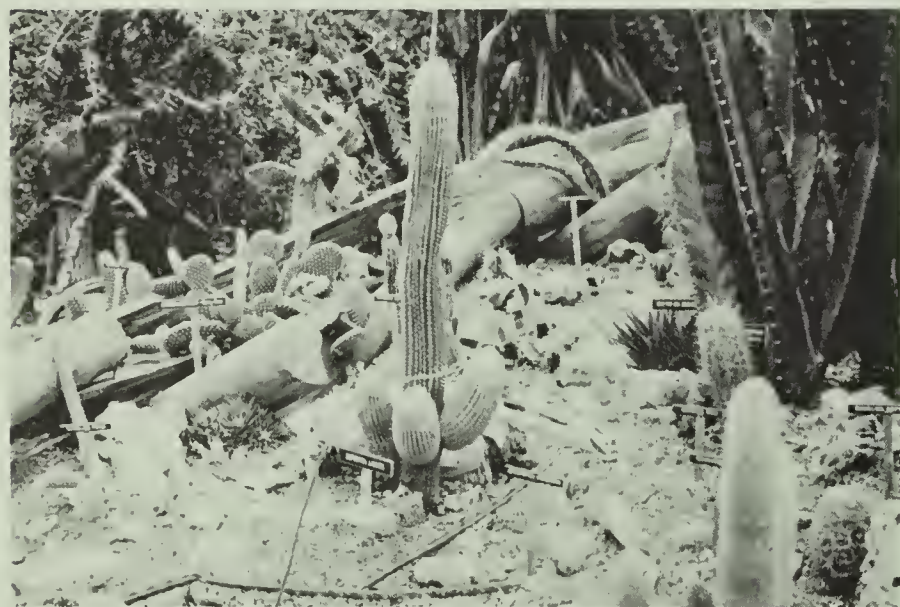


Fig. 21. View in the Bloedel Conservatory



Fig. 22. Quarry Garden in Queen Elizabeth Park

We then drove to Queen Elizabeth Park, a municipal garden spot in which any city in the world might take pride. We had lunch at the newly opened Quarry House and then walked across to the Bloedel Conservatory. This structure is a triodetic dome within which, by ingenious regulation of air currents, three different climatic zones are represented: tropical, rain forest and desert. There are plants here from many countries all living together under a single roof which covers less than half an acre (Fig. 21).

On the overlook outside the conservatory one has a superb panoramic view of the city and down below, in what was a quarry, there has been created a garden of such diversity and riotous color that it was with difficulty that we tore ourselves away from it in order to find time for a drive through Stanley Park (Fig. 22). Here, again, is an enormous municipal park containing a great variety of recreational facilities as well as much natural beauty and monumental plantings.

That evening the tour members were conveyed by taxi and cable car to a restaurant on the summit of a nearby mountain ridge where after dinner we watched the lights of the city come on far below.

We left for home on Monday, May 28, and as we flew south to Seattle the entire Olympic Peninsula, now bathed in sunshine, stood out like a gigantic relief map. And, again, as we soared eastward over the Cascades we had our last look at Mt. Rainier and the lesser peaks which constitute the Washington sector of "The Ring of Fire".

NOTES FROM THE ARBORETUM

THE STAFF

Dr. Gordon's article on "Ohio's Original Vegetation" has been reprinted by the Ohio Forestry Association. This article was illustrated by a large four-color map showing the major vegetational areas of the state. On March 19 he gave an illustrated lecture on "Revelations of the Native Flora" to the West Chester Bird Club.

From May 11 to 22, Dr. and Mrs. Gordon were in the southwest, studying the plants and animals of the Sonoran Desert and visiting the Madera Canyon and the Coronado National Forest. Late in June they participated in the meetings of the Vermont Botanical and Bird Club. They report the publication of their long-awaited *Checklist of Vermont Plants*.

Mr. Heeps has been appointed Director of the Henry Foundation for Botanical Research at Gladwyne, Pa. He has also been elected to the Board of Directors of the American Association of Botanical Gardens and Arboreta. On June 21 he attended a regional meeting of the AABGA which was held at the Brooklyn Botanic Garden.

During the summer Mrs. Hopkins spent a month in England and two weeks in Italy. The purpose of this trip was to visit botanical gardens and take pictures to be used in her teaching in the Arboretum School.

Dr. Marks spent most of the summer studying material of the genus *Papilio* (Lepidoptera) in museums in England, France, Italy and Austria. He and Mrs. Marks then traveled widely throughout Europe.

Dr. Penny was retained during the past summer as a botanical consultant for the Southern Services group of power companies to make a vegetational survey of the forests along the Pascagoula river in southern Mississippi. The study was made in compliance with the National Environmental Policy Act and the Federal Power Commission Order. In the preliminary phase of the survey a primitive area containing groves of *Illicium floridanum*, *Magnolia pyramidata*, and *Magnolia macrophylla* was discovered. A recommendation will be made that the area be set aside as a special forest preserve for the protection of these descendants of ancient Cretaceous flowering plants.

On the occasion of the Hundredth Anniversary of the Germantown Horticultural Society on April 3, Dr. Fogg was the principal speaker. The title of his address was, "The Development of Horticulture in America."

A SOUTH PACIFIC TOUR

The next Arboretum Tour will depart from Philadelphia on Thursday, November 15, for New Zealand and Australia, with visits en route to Tahiti and Fiji, returning home on December 15. As on all previous tours, the

emphasis will be on visits to major botanical gardens as well as on acquiring a knowledge of the native vegetation.

Two days will be spent in Papeete, the capital of Tahiti. One of these will feature a tour of the island with a visit to Matavai Bay, where Captain Cook observed a transit of Venus in 1769. On the second there will be offered a choice of excursions to one of two neighboring islands: Moorea or Bora Bora.

From Tahiti the members of the tour will fly to Auckland in New Zealand's North Island. Here, after a morning at leisure, we shall spend the afternoon inspecting several of the city's beautiful parks and gardens. The following morning we shall pay a visit to a section of the famous Kauri forest north of the city.

Departing from Auckland on Friday, November 23, the party will drive south, stopping at the extraordinary glowworm caves at Waitomo, then on to Rotorua with its Maori village and thermal springs. There will also be a visit to a rhododendron test garden.

Mt. Cook and the Tasman Glacier in South Island will be visited next, after which we shall fly to Te Anau and Takaro Lodge, taking in the photogenic Milford Sound.

No stay in South Island would be complete without a visit to the picturesque city of Christchurch with its winding Avon River, Victoria Park and superb botanical garden. We hope also to see something of the surrounding country.

From Christchurch we shall fly to Melbourne, the capital of Victoria, Australia. Here, among other things, we shall visit the magnificent Royal Botanic Gardens, founded in 1864, Captain Cook's cottage, which has been "transplanted" from its native home in Yorkshire and the Mackenzie Wildlife Sanctuary with its fine representation of Australia's unique fauna—koala, platypus, kangaroo, etc.

In Melbourne our party will bifurcate, one group electing to visit the Great Barrier Reef at Cairns, the other choosing to fly first to Adelaide and then to Canberra. Both are beautiful cities and each possesses a botanical garden of surpassing charm and interest.

On December 5 the two contingents will be reunited in Sydney, the capital of New South Wales, where we shall visit not only the Royal Botanic Garden (the oldest in Australia) but also Botany Bay where Sir Joseph Banks discovered such a rich flora in 1770.

Leaving Sydney on the 8th, the party will fly to Nadi on Viti Levu, the largest island in the Fiji Archipelago. Our four days on Viti Levu will include a cruise to Castaway Island, a night at the sumptuous Fijian Resort Hotel in Yanuca and visit to Korolevu Beach, with plenty of time for swimming and "shelling".

The return trip will be by way of Honolulu where there will be a day of leisure and an optional sight-seeing flight to the outer islands. Between Honolulu and Philadelphia we shall spend a night in San Francisco, arriving home on the evening of Saturday, December 15.

THE CHINESE TULIP-TREE

In 1859 Asa Gray published an important paper dealing with the relationships of the Japanese flora to that of North America and other parts of the north temperate zone. In it he presented a list of species which he considered identical in eastern North America and Japan, some of which also occurred on the mainland of Asia.

More recent studies have demonstrated that, although closely related, most of these disjunct species are not truly identical but are varietally or even specifically distinct.

It seems entirely likely that if the existence in Asia of the genus *Liriodendron* had been known to Gray he might have considered the eastern American tulip-tree (*L. Tulipifera*) to be identical with the tree that occurs in central China.

The Chinese species was discovered by a medical missionary in 1873 and two years later S. Moore, who studied the material, proclaimed it a new species, but refrained from giving it a name. Apparently at this time no flowers had been seen and Moore's opinion was based solely upon the character of the foliage.

In 1886 W. B. Hemsley described the Asiatic tree as a possible variety of the American species, naming it *L. Tulipifera* L. var. ? *chinense*. Some botanists considered the two plants identical, but in 1903, in his *Trees and Shrubs*, C. S. Sargent accorded the Oriental plant full specific status, so that today it is known as *L. chinense* (Hemsl.) Sarg.

In 1952 Mrs. Barnes obtained two small trees labeled *Liriodendron chinense*. One of them died, but the other survived and is now a robust, well-shaped specimen about twenty feet tall with a single trunk. Several visiting botanists to whom I have shown it have expressed doubt as



Fig. 2. *Liriodendron chinense* and *L. Tulipifera*

to whether it really was the Chinese species. I have repeatedly examined the foliage and have been unable to discover any difference between its leaves and those of *L. Tulipifera*.

On May 30, 1973, our tree bore flowers for the first time and all doubts concerning its identity were completely dispelled. The flowers are appreciably smaller than those of *L. Tulipifera* and are borne on peduncles which are somewhat curved. The corollas are cup-shaped and the petals are a dull olive green with a faint splash of yellow at the base (Fig. 1). The petals of the American tulip-tree, on the other hand, are greenish yellow with a broad orange band below the middle (Fig. 2). If our tree bears fruit it will be interesting to observe whether the mature carpels are obtuse at their tips rather than acute, as mentioned in some descriptions.

Knowing that my friends at the United States National Arboretum were keenly interested in these two species, I put in a call to Dr. Frank S. Santamour, Jr. to inform him that our tree was in flower and to offer him pollen for the purpose of crossing it with the American species. He replied that, unfortunately, the latter was already well past flower in Washington and that we would have to wait until another year to attempt the experiment.

A few days later I received a letter from Santamour's colleague, Dr. Frederick G. Myer, saying he had heard about our tree and imploring me to prepare a herbarium specimen for them; I had already done so. He informed me that ours was the eighth report that they had received of the flowering of *L. chinense* in this country, the most recent being a thirty-five foot specimen in the Coker Arboretum at Chapel Hill, North Carolina.

The cross between these two species has already been made and was reported by Dr. Santamour at a recent meeting of the American Magnolia Society. Continuing efforts should be made to produce and study the progeny of these two representatives of a very ancient genus.



Fig. 1. *Liriodendron chinense*